5.13   alldifferent_between_sets

Origin   ILOG

Constraint   alldifferent_between_sets(VARIABLES)

Synonyms   all_null_intersect, alldiff_between_sets, alldistinct_between_sets, alldiff_on_sets, alldistinct_on_sets, alldifferent_on_sets.

Argument   VARIABLES : collection(var−svar)

Restriction   required(VARIABLES, var)

Purpose   Enforce all sets of the collection VARIABLES to be distinct.

Example $(\langle\mathtt{var} - \{3, 5\}, \mathtt{var} - \emptyset, \mathtt{var} - \{3\}, \mathtt{var} - \{3, 5, 7\}\rangle)$

The alldifferent_between_sets constraint holds since all the sets $\{3, 5\}$, $\emptyset$, $\{3\}$ and $\{3, 5, 7\}$ are distinct.

Typical $|\mathtt{VARIABLES}| > 2$

Symmetry   Items of VARIABLES are permutable.

Arg. properties   Contractible wrt. VARIABLES.

Usage   This constraint was available in some configuration library offered by Ilog.

Algorithm   A filtering algorithm for the alldifferent_between_sets is proposed by C.-G. Quimper and T. Walsh in [335] and a longer version is available in [336] and in [337].

See also   **common keyword:** link_set_to_booleans *(constraint involving set variables)*.

                        specialisation: alldifferent *(set variable replaced by variable)*.

                        used in graph description: eq_set.

Keywords   **characteristic of a constraint:** all different, disequality.

                        constraint arguments: constraint involving set variables.

                        filtering: bipartite matching.

                        final graph structure: one_succ.

Arc input(s)	VARIABLES
Arc generator	$CLIQUE \mapsto$ collection(variables1, variables2)
Arc arity	2
Arc constraint(s)	eq_set(variables1.var, variables2.var)
Graph property(ies)	**MAX_NSCC** ≤ 1
Graph class	ONE_SUCC

Graph model

We generate a *clique* with binary *set equalities* constraints between each pair of vertices (including a vertex and itself) and state that the size of the largest strongly connected component should not exceed 1.

Parts (A) and (B) of Figure 5.31 respectively show the initial and final graph associated with the **Example** slot. Since we use the **MAX_NSCC** graph property we show one of the largest strongly connected components of the final graph. The alldifferent_between_sets holds since all the strongly connected components have at most one vertex.
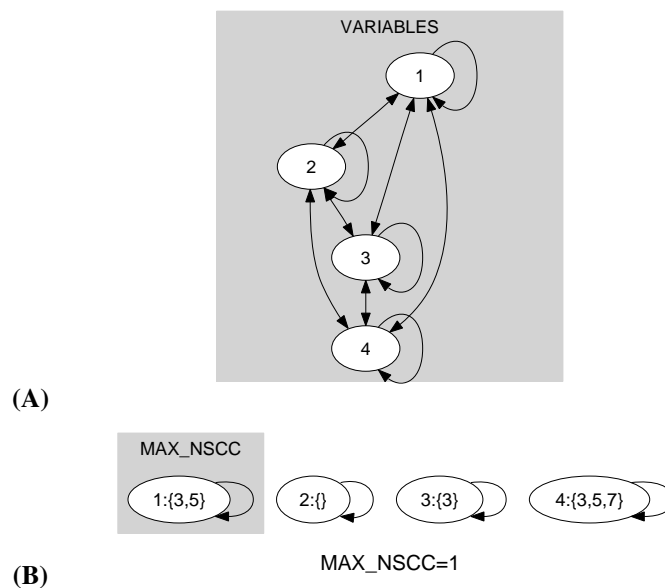

(A)

(B)

Figure 5.31: Initial and final graph of the alldifferent_between_sets constraint